

Claims:-

1. A pump including a cavity with an inlet port and an outlet port opening into and from the cavity, a flexible membrane located within the cavity and arranged to be bi-stable in two states corresponding to completion of inlet and exhaust of a pumping cycle.
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2. A pump as claimed in claim 1 wherein the flexible membrane is mounted in the cavity with a preset whereby the membrane adopts one of the stable states.
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3. A pump as claimed in claim 1 or 2 wherein the membrane is formed from an elastomeric material.
4. A pump as claimed in claim 1, 2 or 3 wherein the membrane is formed from elastomeric sheet material.
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5. A pump as claimed in any one of claims 1 to 4 wherein the membrane is clamped between first and second housing sections, each section having a cavity section such that when the housing sections are assembled to form a housing, said cavity is formed.
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6. A pump as claimed in any one of claims 1 to 5 wherein a port opens into said cavity, said port being connectable to a source or sources of positive and negative pressures.
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7. A pump as claimed in claim 3 wherein the cavity is located in a pump housing, the cavity being connectable to a source or sources of negative and positive pressure and means to cyclically apply the positive and negative pressures to the cavity to cause the membrane to move between the stable states.

8. A pump as claimed in claim 7 wherein the cavity is connected to inlet and exhaust ports.
- 5 9. A pump as claimed in claim 8 wherein the housing includes first and second housing sections configured to form said cavity when the housing sections are joined together and to clamp the membrane about a peripheral margin thereof.
- 10 10. A pump as claimed in claim 9 wherein the first housing section includes a recess into which the membrane is located, the peripheral dimensions of the membrane being greater than those of the recess whereby compressive forces are set up in the membrane when it is installed in the recess.
- 15 11. A pump as claimed in claim 10 wherein the second housing section includes a protruding portion which engages in the recess when the first and second housing sections are combined together, to cause the membrane to be clamped in place.
- 20 12. A pump as claimed in claim 9, 10 or 11 further including a third housing section coupled to the second housing section, said third housing section including means for facilitating connection of inlet and outlet conduits for pumpable material.
- 25 13. A pump as claimed in claim 12 wherein the second and third housing sections include inlet and outlet openings and means for locating therein a valve element.
14. A pump as claimed in claim 13 wherein the valve element is a disk of flexible material.

15. A pump as claimed in claim 6 wherein the cavity is elongate and the port is offset in the length of the port.

5 16. A pump as claimed in any one of claims 7 to 14 wherein the cavity is elongate and of curved cross-section, a port via which the source(s) of positive and negative pressure are connectable opens into the cavity.

17. A pump as claimed in claim 15 or 16 wherein the ends of the elongate cavity are complex curved.

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18. A pump substantially as herein described with reference to the accompanying drawings.

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Claims:-

1. ~~A pump including a cavity with an inlet port and an outlet port opening into and from the cavity, a flexible membrane located within the cavity and arranged to be bi-stable in two states corresponding to completion of inlet and exhaust of a pumping cycle.~~
2. ~~A pump as claimed in claim 1 wherein the flexible membrane is mounted in the cavity with a preset whereby the membrane adopts one of the stable states.~~
3. A pump as claimed in claim ~~1~~191 or 2 wherein the membrane is formed from an elastomeric material.
4. A pump as claimed in claim ~~3~~1, 2 or 3 wherein the membrane is formed from elastomeric sheet material.
5. A pump as claimed in ~~any one of claims 191 to 4~~ wherein the membrane is clamped between first and second ~~housing sections of the housing~~, each housing section with one of the opposing surfaces having a cavity section such that when the housing sections are assembled to form ~~thea~~ housing, ~~saidthe~~ cavity with opposing surfaces is formed.
6. A pump as claimed in ~~any one of claims 191 to 5~~ wherein a port opens into said cavity, said port being connectable to a source or sources of positive and negative pressures.
7. A pump as claimed in claim ~~3~~6 further including a device wherein ~~the cavity is located in a pump housing, the cavity being connectable to a source or sources of negative and positive pressure and means to cyclically apply the positive and~~

negative pressures to the cavity to cause the membrane to move between the stable states.

8. ~~A pump as claimed in claim 7 wherein the cavity is connected to inlet and exhaust ports.~~

9. A pump as claimed in claim 58 wherein the housing includes ~~first and second housing sections configured to form said cavity when the housing sections are~~ joined together and to clamp the membrane about a peripheral margin thereof.

10. A pump as claimed in claim 59 wherein the first housing section includes a recess into which the membrane is located, the peripheral dimensions of the membrane being greater than those of the recess whereby compressive forces are set up in the membrane when it is installed in the recess to thereby create the preset.

11. A pump as claimed in claim 610 wherein the second housing section includes a protruding portion which engages in the recess when the first and second housing sections are combined together, to cause the membrane to be clamped in place.

12. A pump as claimed in claim 199, 10 or 11 further including a third housing section coupled to the second housing section, said third housing section including means for facilitating connection of inlet and outlet conduits for pumpable material.

13. A pump as claimed in claim 12 wherein the second and third housing sections include inlet and outlet openings and means for locating therein a valve element.

14. A pump as claimed in claim 13 wherein the valve element is a disk of flexible material.
15. A pump as claimed in claim 6 wherein the cavity is elongate and the port is offset in the length of the ~~port~~cavity.
16. A pump as claimed in ~~any one of claims 7 to 14~~ wherein the cavity is elongate and of curved cross-section, a port via which the source(s) of positive and negative pressure are connectable opens into the cavity.
17. A pump as claimed in claim 15 or 16 wherein the ends of the elongate cavity are complex curved.
- ~~18. A pump substantially as herein described with reference to the accompanying drawings.~~
19. A pump including a housing, a cavity with opposing surfaces, an inlet port opening into the cavity, an outlet port opening from the cavity, a pressure port connected to the cavity, a flexible membrane located within the cavity, the flexible membrane being mounted with a pre-set applied thereto such that the membrane adopts a first stable state in contact with one of the opposing surfaces of the cavity and can be caused to invert into a second stable state by the application of pressure to the cavity via the pressure port, the bi-stable membrane thereby being movable between the first and second stable states corresponding to completion of inlet and exhaust of a pumping cycle.
20. A pump as claimed in claim 7 wherein the clamping of the membrane creates further compressive forces in the membrane.